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ABSTRACT

As a joint endeavor by the Departments of Defense, Transportation, and Health, Education, and Welfare to demonstrate military resources and techniques which are utilized in combat, the Military Assistance to Safety and Traffic (MAST) program was pilot-tested in 1970 at five military bases. Undertaken to explore the feasibility of utilizing military helicopters and military paramedical personnel in responding to civilian medical emergencies, particularly highway accidents, MAST was essentially an operational test where military resources of known capability were meshed with local Emergency Medical Service systems, without the provision of additional resources and without administrative difficulties. Program effectiveness and community acceptance varied for each site. Numerous photographs illustrate the text, which includes extensive recommendations and conclusions. The following topics are focused upon: (1) a medical evaluation of the program, (2) background and actual experiences of the program, (3) the civilian viewpoint, (4) military aspects, (5) helicopter considerations, (6) cost considerations, (7) legal aspects, and (8) future activity. (Author/AG)

DOT-TSC-2

MAST

MILITARY ASSISTANCE TO SAFETY AND TRAFFIC

Report of Test Program by the Interagency Study Group

July - December 1970

A cooperative effort to save lives
by the
Department of Defense, Department of Transportation
and Department of Health, Education, and Welfare

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NOTE: The Appendices to the MAST Report were not printed because of the large amount of material contained therein. Included in the Appendices are: background correspondence, site reports, cost data, medical evaluation proposals, U.S. Army National Guard involvement, National Medevac concept, and civilian air ambulance operations.

Information on the above may be obtained by writing: MAST Executive Secretary, Department of Transportation, Washington, D.C.

SUMMARY

The Military Assistance to Safety and Traffic (MAST) program was undertaken to explore the feasibility of utilizing military helicopters and service paramedical personnel in responding to civilian medical emergencies, in particular to highway accidents. During several months in 1970, pilot or demonstration projects were implemented at five military installations. Three projects were sited at Army installations and two at Air Force Bases. The program represented a joint endeavor by the Departments of Defense (DOD), Health, Education, and Welfare (DHEW) and Transportation (DOT) to demonstrate, in civilian applications, the capabilities of those military resources and techniques which have been employed so effectively in combat. MAST was essentially an operational test, where military resources of known capability were meshed with local Emergency Medical Service (EMS) systems with a minimum of delay and administrative difficulty, and

with no additional men, money, or aircraft provided.

The substance of this report clearly demonstrates that it is entirely feasible to utilize military helicopters and paramedical personnel to augument local EMS systems. The extent to which the military capability made an effective contribution varied with circumstances, as detailed in the report. At one of the MAST sites, military operations were distinctly successful, and the program had a high degree of community acceptance and acclaim. At the other sites, operations were successful, but a lower degree of utilization and public involvement was experienced.

Based upon the experience achieved during the trial period, continuation and expansion of the program to additional sites is recommended. A comprehensive evaluation of the MAST program at the most active site (San Antonio) is being prepared by Ohio State University (OSU), under a DHEW contract. This will be submitted as an additional report when that work has been completed in the next few months.

CONCLUSIONS

1. Although operational experience was limited by the short period of the test program and the limited number of test sites, it demonstrated that the concept of using military helicopters and paramedical personnel in an air ambulance role to respond to civilian medical emergencies is entirely feasible from both the military and civilian viewpoint.

2. The military services possess a significant capability for providing assistance to civilian emergencies in terms of helicopters particularly suitable as air ambulances, trained paramedical personnel, immediate 'round-the-clock response, communications, and related support. This capability does not exist to the same degree in the civilian community at present, owing largely to financial considerations.

3. The type of military aviation unit supporting the MAST operations had no bearing on its capability for conducting air ambulance

operations. The unit's responsiveness to MAST requests, however, was directly related to its primary military mission.

- Army medical air ambulance units are particularly well suited for supporting civilian medical emergencies. Such missions provide realistic training, experience, and motivation for assigned personnel.

- Army tactical aviation units can provide a responsive air ambulance service, but personnel and helicopters must be diverted from training to sustain a continuous effective effort.

- Air Force local base rescue units, although ideally organized and equipped for performing MAST missions, require a u gmentation to provide full responsiveness for assisting in civilian medical emergencies. This is due to their assigned military missions, and the small number of helicopters and crews authorized/ assigned at each base.

4. Throughout the entire test period, military assistance to civilian emergencies was provided by the supporting aviation units without significant degradation of unit integrity, effectiveness, training, and impairment of their primary military mission.

5. The availability of military resources (aircraft and personnel) and the establishment of the necessary mechanism for responding to civilian medical emergencies does not necessarily ensure that the community will utilize the military capability fully or effectively.

6. Less than full-time capability for response by the helicopter activity tends toward a limited utilization of the service by the community.

7. The degree of utilization of the military helicopters, once a responsive service was established, was not a function of any factors within the military, but was related to factors in the community which were not precisely identified.

8. The local community's emergency medical system must be highly developed and well-organized to fully integrate and make the most effective use of military air ambulances. An adequate emergency medical communication system is vital for making responsive and effective use of military air ambulances. It assures prompt notification, proper coordination, and direct communication between the military and various elements of the emergency medical system.

9. A high degree of acceptance of the MAST program was demonstrated by local government, the general public, the medical and

hospital community, and law enforcement officials. Some degree of reluctance on the part of law enforcement officers to request MAST missions appeared to be a factor which limited the use of military helicopters at some test sites.

10. No additional men, money, or aircraft were required by the military units supporting MAST operations.

11. Costs and operating data from the test program are of limited value to civilian helicopter operators, because the aircraft involved are larger and more expensive to purchase and operate than those presently used for most civilian operations.

RECOMMENDATIONS

1. MAST should be continued as a demonstration program until the Stanford Research Institute Study* is completed and evaluated. Any expansion should be held in abeyance until the overall evaluation of the program is completed.

2. In the selection of additional sites, consideration should be given to those communities where MAST assistance has been requested and where investigation indicates the likelihood of effective utilization.

3. In the development of future MAST projects, adequate time should be allowed for planning, organizing, and disseminating operational procedures. The local emergency medical service should be viewed as a system and participation by all EMS elements, including any civilian helicopter operations, should be encouraged.

The Department of the Army has contracted Stanford Research Institute to evaluate the operations and marginal costs of MAST alternatives. This study is to be completed by September 30, 1971.

4. The process of implementing a MAST project in a State should be coordinated through the Governor's office, so that operations may be interfaced with civilian emergency services.

5. A cooperative relationship with civilian helicopter operators should be established and maintained to provide for the most effective development of both military and civilian air ambulance operations.

6. Enabling legislation must be secured prior to implementation of MAST as a permanent national program.

INTRODUCTION

The purpose of the MAST program was to test, by actual operation, the feasibility of using military helicopters and paramedical personnel to respond to civilian medical emergencies. This report sets forth the background which led to the implementation of the MAST program; relates the operational experience; makes a judgment as to the feasibility of the MAST concept, from both the military and civilian viewpoint; discusses some cost considerations; and presents a number of conclusions and recommendations for expansion of the MAST program. Because many elements of the MAST operations are being treated more comprehensively in a DHEW supported MAST evaluation study being prepared by Ohio State University, detailed matters are not specified in this report.

It should be recognized that the MAST operational experience was limited both in time and in the number of sites at which the program was conducted. A further limitation was the stipulation that the program was to be undertaken with existing military resources and that no additional men, money, or equipment were to be provided. The time factor is particularly significant, since information obtained from civilian helicopter projects and confirmed by U.S. Coast Guard experience, indicates that *establishment* of a new service does not mean that effective utilization will ensue immediately, or even in a matter of months.

BACKGROUND ON MAST

On August 26, 1969, the Secretary of Defense suggested to the Secretary of Transportation that an Interagency Planning Group, representing the Departments of Defense, Health, Education, and Welfare, Justice, Interior, Transportation and the Office of Emergency Preparedness be established to consider a proposal to use military resources in response to civilian medical emergencies. Of specific interest was the employment of military helicopters and paramedical personnel in responding to highway accidents. In his letter of September 28, 1969, the Secretary of Transportation concurred with the idea of establishing the study group. The Undersecretary of Transportation was appointed chairman. One consideration for having the Department of Transportation chair this effort was that the

Department, through its National Highway Traffic Safety Administration (NHTSA), had funded a number of helicopter air ambulance demonstration projects under the Highway Safety Act. It was also engaged in facilitating the use of Coast Guard helicopters, when available for civilian emergencies through local arrangements between Coast Guard District Commanders and state officials. (Experimentation with the use of military helicopters, communications, and medical personnel for this type activity was also proposed in the Report of the President's Task Force on Highway Safety in December, 1969).

The acronym MAST (Military Assistance to Safety and Traffic) was given to the program and the first meeting of the MAST Interagency Study Group was held on December 11, 1969. At this meeting it was agreed that the general question of how military helicopters and other military resources could be utilized for responding to civilian emergencies would be studied. Four major working groups comprised of members from the participating agencies were established. The first group was to analyze the legal and federal state and local relationships; the second, the command, control and communications aspects; the third, funding and coordination; finally, an executive group was to coordinate the overall operation of the program.

On February 3, 1970, the Interagency Study Group met to consider the work of the several sub-groups and determined that the MAST program would be developed in the following manner: Phase 1 - design of the project and site selection; phase 2 - operations; phase 3 - evaluation; and phase 4 - report and recommendations. DOT, DHEW, and DOD, were each asked to provide a full time working member to undertake the basic program activity. These individuals were designated the MAST administrative staff.

In April, 1970, the MAST administrative staff visited three sites: San Antonio, Texas; St. Louis, Missouri; and Lincoln, Nebraska, representing a regular Army unit, a Reserve unit, and a National Guard unit. In subsequent correspondence between DOD and DOT, it was agreed that the number of test sites should be limited to five, and that initially only active duty military units would be utilized. Accordingly, additional sites at Fort Lewis, Washington, Fort Carson, Colorado, Luke AFB, Arizona, and Mountain Home AFB, Idaho, were selected. The selection criteria used were: the existence of a military capability; a State-government expression of interest in having the military involvement; a rural environment contiguous to adequate medical activity; and different climate and terrain conditions.

At each site, essentially the same procedure was followed. The concept of using the military helicopters and paramedical personnel was presented to the community's medical, public safety, and political

leadership in a meeting organized by DHEW affiliates. An offer was made to make these resources available, if desired, on the basis of a simple project proposal to be prepared and submitted by the civilian and military representatives of the geographical area.

At all sites, the idea was enthusiastically received, proposals were submitted, and upon their approval by the Interagency Study Group, MAST operations were authorized. Operations began in San Antonio, Texas, on July 15, 1970; Colorado Springs, Colorado, and West Central Washington operations began on August 6, 1970; and Phoenix, Arizona, and Boise, Idaho, operations were implemented on September 1, 1970.

At each site, the program was developed by the civilian community working with the military project officer. General requirements were that the helicopters would augment or supplement the local EMS system, not replace any existing elements of it; that the operation would not be directed into downtown or metropolitan areas where ground ambulance services in general would be more responsive; and that the military operations should avoid any competition with operators of air or ground ambulance services. Requests for the helicopter assistance were based upon judgment by responsible medical or public safety officials at the scene of the emergency that the patient's medical condition was serious or life-threatening and required his expeditious transport to a medical facility capable of providing the necessary treatment.

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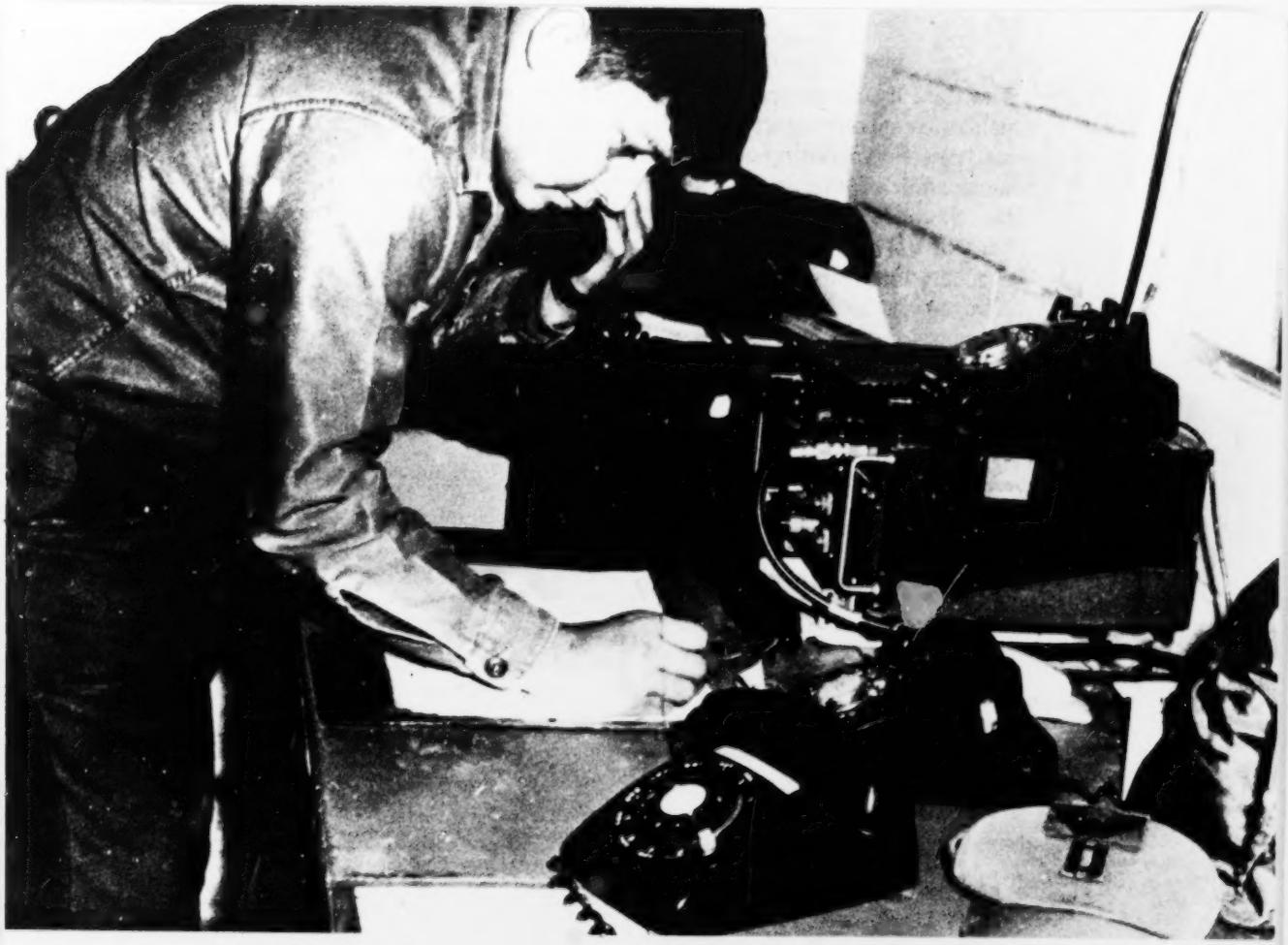

OPERATIONAL EXPERIENCE

From July 15 through December 31, 1970, *182* MAST missions were flown by helicopters from all sites—more than one mission a day. Tabulations of the operating data is set forth on the following page. Operating procedures are presented in the site reports. Basically, operations employed military helicopters in an air ambulance role. No law enforcement, surveillance, or other related functions were undertaken. Responses to missions were based solely upon a judgment by responsible medical or public safety officials that a serious emergency existed. Some 48% of those patients assisted were highway accidents victims. Seventy-two percent of the missions flown were inter-hospital transfers generally involving a patient who had been initially taken to a local hospital, where it had been determined that he required transfer to receive more definitive medical treatment. (Because of the program's accomplishments, operations at all five sites are being continued. As of August 22, 1971, 553 missions have been flown and 718 persons assisted.)

The data below compares the MAST test operations with two civilian helicopter medical projects funded by the NHTSA. The total number of missions flown during similar periods of operations is roughly of the same order of magnitude. Although a number of factors would have to be taken into account to draw any useful conclusions from this comparison, it is interesting to note that the average number of patients evacuated per mission is approximately the same (1.3) for the projects. This tends to support the conclusion from previous studies that helicopters used for responding to civilian medical emergencies should be capable of transporting two patients simultaneously.

Project	Missions	Patients	Hours	Average Number Patients Per Mission
MAST				
4-6 months (5 bases)	182	249	290	1.3
AMES				
6 months (1 base)	171	225	306	1.3
CARE-SOM				
6 months (3 bases)	239	332	195	1.4

The following data shows the wide variation in the number of missions flown in the five MAST areas.

MAST Unit	Missions	Patients
FORT SAM HOUSTON	114	138
FORT LEWIS	34	44
FORT CARSON	25	45
LUKE AIR FORCE BASE	5	18
MOUNTAIN HOME AIR FORCE BASE ..	4	4

MAST OPERATING DATA
July 15–December 31, 1970

Site	Months of Experience	Number Missions	Hours Flown	Patients Evacuated				
				Highway Casualties	Other Medical[1] Emergencies	Total	Number[2] Critical/Serious	Number Non-Critical
FORT SAM HOUSTON Texas	5½	114	141.4	86	52	138	82	56
FORT CARSON Colorado	5	25	87	15	30	45	22	23
FORT LEWIS Washington	5	34	41	14	30	44	19	25
LUKE AFB Arizona	4	5	13.2	3	15	18	5	13
MOUNTAIN HOME AFB Idaho	4	4	7.5	0	4	4	3	1
TOTAL		182	290.1	118	131	249	131	118

1/ Includes heart attacks, gunshot wounds, accidental injuries, illness, premature infants, burns, etc.

2/ Patients admitted to hospitals in critical or serious condition, as recorded in admission reports

MAST OPERATING EXPERIENCE
July 15–December 31, 1970

Data Elements	San Antonio Texas 7/15/70	Colorado Springs Colorado 8/6/70	West Central Washington 8/6/70	Mountain Home Idaho 9/1/70	Phoenix Arizona 9/1/70	TOTALS
MISSIONS						
Total Number	114	25	34	4	5	182
Day	56	20	21	3	3	103
Night	58	5	13	1	2	79
Average time per mission	1 Hr 12 Min	3 Hrs 30 Min	1 Hr 12 Min	1 Hr 54 Min	2 Hrs 39 Min	
Average time to lift off	2 Min	20 Min	6 Min	48 Min	30 Min	
Average time to pickup site	27 Min	52 Min	29 Min	1 Hr 6 Min	30 Min	
Average time from pickup to hospital	24 Min	1 Hr 11 Min	25 Min	36 Min	30 Min	
Average distance to pickup site	48 Miles	62 Miles	38 Miles	62 Miles	30 Miles	
Aborted missions	6	2	3	6	0	17
Weather	0	0	2	0	0	2
Other	6	2	1	6	0	15
HOURS FLOWN						
Total number	141.4	87	41	7.5	13.2	290.1
Day	66.4	70	24	4.2	6.6	171.2
Night	75	17	17	3.3	6.6	118.9
PATIENTS						
Total Number	138	45	44	4	18	249
Day	57	37	25	3	6	128
Night	81	8	19	1	12	121
Critical	82	22	19	3	5	131
Non-critical	56	23	25	1	13	118
Dead on arrival	4	0	1	0	0	5
Died after admission	2	4	1	0	1	8
Type of Patients						
Highway accident	86	15	14	0	3	118
Inter-hospital transfer	111	20	0	0	0	131
Premature infant	4	5	2	0	0	11
Hoist	1	0	0	1	3	5
Other	52	5	30	4	15	106
Hospitals with helipads	18	4	5	4	5	36

Considerable attention was directed to determining the causes of the significant disparity between the various projects. Obviously, the projects were located in varying population bases as to number, distribution, and urban/rural configuration. Each area had emergency medical systems with elements which varied in number and capability. However, other less tangible factors are believed to be of greater relevance.

The relatively low mission activity at the two Air Force sites is partially attributed to the inability of the local base rescue units, as presently constituted, to maintain a 'round-the-clock, immediate response capability because of the limited number of helicopters and crews and the nature of their primary military mission. The test program was to determine the feasibility of using military resources in varying circumstances. Intuitively, one might expect that even with only a part-time availability, MAST services would experience a high demand. While operations were limited, the data indicates that a part-time response capability will not be effectively utilized. This factor was confirmed in discussions with several responsible law enforcement officials.

The relatively high mission activity at San Antonio is attributed to a fortuitous combination of many factors. These included a large metropolitan area, a full-time medical company conducting the MAST operations, good command-level support, effective local planning and organization, favorable terrain and weather conditions, cooperating hospitals with helicopter-landing facilities, and an unusually high degree of active and favorable publicity concerning the program. During the first days of MAST operations, a mission was flown which was credited with saving a youth's life. This incident became front-page news, and the program was off to a flying start. Location of the MAST unit in San Antonio proper—a city where the military enjoys a close and favored association with the community—appeared to be a real, although intangible, reason for the obvious success of the project.

The reasons for the limited operational activity in Washington and Colorado are similar. MAST operations were conducted by regular Army tactical units located contiguous, but not central, to a populous metropolitan area. They did not enjoy the homogeneous political and operating area that characterized San Antonio, and were not as closely located to centers of emergency medical service. Some reluctance was expressed in both project areas to commit community resources and attention to a program which was recognized as a demonstration, with no assurance of its continuation. Established patterns in local emergency care systems were not dramatically altered by MAST. Reluctance to request military assistance was understandably generated following the loss of one helicopter and crew of four from Fort Lewis while making an approach on a MAST mission. Law enforcement officials felt responsible for the accident, and were reluctant to request

further MAST missions. Weather conditions caused some aborted missions, and this probably raised some doubts as to the legitimacy of requesting MAST missions.

The location of the helicopters, away from population centers, and a limited public awareness of MAST activity in Washington and Colorado influenced the lower utilization of the service at these sites. Although considerable effort was made by the military and civilian project personnel to sell the program, no significant increase in mission activity has been noted. Taking all factors into consideration after extensive discussion with both military and civilian project representatives concerned, *definitive causes of the lower utilization at these sites were never fully and satisfactorily established.* The military unit never failed to respond, except in those weather conditions cited. The simple fact is that fewer requests were received than would have been expected.

No major difficulties were encountered during the test phase of the program that would affect the establishment of MAST projects in other locations. Communications between the helicopter and civilian EMS elements– public safety and medical–could have been greatly improved with more adequate equipment, but this inadequacy did not significantly hamper operations. The program essentially tested only the feasibility of the military involvement and did not feature any new techniques or exotic procedures. It was a simple operation requiring intensive community support, organization, and selling. Operating procedures must be simple, well-understood, and thoroughly disseminated.

MEDICAL EVALUATION

An attempt has been made to evaluate the medical justification of calling for a MAST mission rather than depending on available ground ambulance transportation and personnel. The decision to call for a MAST mission was sometimes made by physicians, especially in the case of hospital transfer. It is not prudent to question the decision of a physician at the scene of a medical emergency that he and the medical facilities available are not adequate to care for a patient and that rapid, i.e., MAST evacuation of the patient to a major treatment center is necessary. In other instances (especially at the scene of an accident or acute illness), the decision to call for a MAST mission is made by a law enforcement official.

The medical evaluation in large part answers the questions: how often were the missions justified on a basis of severity of the patient's condition, distance (measured in time for ground transportation), isolation of the site, or combination of these factors?

The mission reports were reviewed for the following four sites: Fort Lewis, Washington; Fort Carson, Colorado; Mountain Home AFB, Idaho; and Luke AFB, Arizona. Since a contract has been awarded to Ohio State University to conduct a detailed evaluation of the Fort Sam Houston, Texas, test site, no attempt was made to evaluate the missions from that site. The objective of the MAST program was to test the feasibility of using military helicopters and personnel for evacuating civilian medical emergencies. Evaluation of the medical justification of utilizing this form of rapid patient transportation was not a major goal of the test project. It should be noted that the reporting forms used were adapted from another project and did not lend themselves to facilitation of medical evaluation. Regrettably, the patient's condition upon arrival at a major treatment center and the subsequent course of his illness were not documented by physicians in most instances.

It should also be pointed out that some unnecessary calls are justified when law enforcement officials are placed in a position of making a medical decision. In the interest of the patient, the error should always be in the direction of calling for the MAST mission.

At the four sites, fifty-six flights were evaluated on which one or more patients were transported. A total of seventy-three patients were transported on these flights. Of the fifty-six flights, a total of forty-six were judged to be justified on a basis of the condition of one or more of the patients transported, distance from a treatment facility (measured in time required for ground transportation), isolation of the site, or combinations of these factors. Of the forty-six flights, fifteen were justified in large part by the remoteness of the pick-up site, although many of these patients were severely ill or injured. On six

flights, there was insufficient patient information available on which to make a judgment. On four flights, the mission apparently was not justified. Of these four flights, one was for a liver transplant patient, one was for a child with convulsions, one was for a patient with a gunshot wound of the lower leg, and one was for a young woman with acute bronchitis who was apparently not in severe respiratory difficulty. It is felt that ground transportation would not have deleteriously affected these patients.

FEASIBILITY OF MAST—MILITARY ASPECTS

The limited MAST experience demonstrated that the concept of using military helicopters and paramedical personnel to respond to civilian emergencies is operationally feasible. Further, it proved desirable from the standpoint of training and motivation for the medical unit in particular. Aeromedical evacuation procedures developed for combat situations are readily transferrable to civilian applications. Public acceptance of the concept was clearly established and reflected most favorably upon the military.

Although the military has traditionally responded to civilian emergencies, this assistance has previously been rendered on an individual, local, "ad hoc" basis with no prearranged plan or procedures. MAST built upon this background by providing an authoritative sanction and mission. It brought together military and

civilian authorities and provided efficient procedures to make the military contribution rapid and effective. Feasibility, from the military viewpoint, was established by the fact that MAST missions were successfully carried out by regularly constituted military units with no additonal resources committed to the program. While men and aircraft were, in varying degrees, dedicated to the MAST missions, at no site did MAST operations exceed the regular flying time programmed for the supporting aviation unit. The MAST mission did not significantly detract from the basic military mission, although the measures taken by the tactical aviation units to maintain the response capability necessary for a satisfactory service did represent some diminution of unit training.

By the nature of their mission and orientation, Army medical air ambulance units are particularly effective in supporting the civilian EMS, as evidenced by the distinct success of the San Antonio project. Based upon extensive discussion with unit personnel, MAST missions flown by the 507th Medical Company had no degrading impact on either unit training or operations, and by their very nature provided realistic training experience and motivation for 507th personnel.

Army tactical units, while more limited by the constant demands of their training mission, can also respond to civilian emergencies effectively. To provide the necessary instant response capability, however, helicopters and personnel must be diverted from "line" training activity. It may be necessary to augment these tactical units with additional aircraft and personnel, as well as to recognize MAST-type activity as part of the unit mission, if they are tasked to provide responsive air ambulance support to the civilian community. *MAST operations were a "natural" for the medical company, but an "add-on" for the tactical units.*

Military priorities and the small number of helicopters and crews severely minimized the effectiveness of the two Air Force projects. The Air Force sites did not have the capability for immediate, 'round-the-clock response, and this operated to the detriment of these projects. At one site, after having experienced what seemed an inordinate response time, the law enforcement officials understandably were reluctant to rely upon the service, even though response at other times would have been satisfactory. Although the operations conducted were quite successful and were undertaken with vigor and enthusiasm by the units involved. the experience confirmed what had been noted in civilian projects sponsored by NHTSA, namely, that less than full-time, 'round-the-clock capability is not accepted as a responsive service by the local EMS system. Because of their primary mission of local base rescue, and the size of the aviation activity, this type of unit cannot provide the immediate response needed to achieve the degree of utilization and acceptance experienced elsewhere.

FEASIBILITY OF MAST—CIVILIAN VIEWPOINT

The feasibility of MAST from the civilian viewpoint is shown by the testimonial material in the Appendices and, also, by the specific requests for MAST by other communities. The medical evaluation will also support the feasibility of augmenting the civilian EMS system with military helicopters. Discussion with medical and public safety officials in the MAST communities confirmed the public recognition of need and feasibility of the MAST concept.

The effective utilization of the military resources was directly influenced by the proficiency, organization, and leadership of the civilian EMS systems they supplemented. Experience indicated that no one system design or operating procedure could, or should, be

developed to fit the varying circumstances of different communities or regions. EMS system capabilities vary tremendously in nature and scope around the country. Success of MAST operations is conditioned by such factors as the extent of training of law enforcement and hospital personnel, the extent of community awareness and information efforts, communications capability, the type of medical facilities and their capabilities, and the active involvement of the local leadership in the program.

While the MAST operations were brought into being with a minimum of delay from the time the concept was presented to the community until flying operations were begun, experience demonstrated that more time for planning, organizing, and selling the program would have been desirable. Involvement of more elements of the local or regional communities might have been achieved. It takes time to implement and perfect basic operating procedures at all of the working levels and jurisdictions in the areas which encompass MAST activities.

A particularly desirable feature of the program was that it provided the occasion at some sites for the community to train military paramedical personnel in civilian aspects of emergency medical service. Conversely, the military had the opportunity to conduct briefings and train members of the civilian community in the military aspects of the operation. By such measures, the overall EMS system derived benefit, and closer and more desirable working relationships resulted.

MILITARY AND CIVILIAN HELICOPTER CONSIDERATIONS

The MAST concept was immediately accepted by local officials and the general public at all sites. The only objections to MAST were presented by private helicopter operators associated with the Helicopter Association of America (HAA). MAST was viewed by the private operators and HAA as an "encroachment" by the Federal Government and the military into what they consider to be the domain of private enterprise.

In present circumstances, the military capability—adequate helicopter air ambulances, trained paramedical personnel, immediate, 'round-the-clock response time, communications and support— simply does not exist to the same degree in the civilian community. The NHTSA funded five demonstration projects utilizing civilian helicopters under Section 403 of the Highway Safety Act. This type of activity is relatively costly, and few communities are able to justify or support helicopter air ambulance service against a background of other urgent needs in emergency medical services. Under Section 207 of the Highway Safety Act, the States estimated their own needs to achieve the performance levels of the Highway Safety Program Standard on Emergency Medical Services. These estimates totalled $209,000,000 for FY '72 alone. Emergency Medical Services suffer deficiencies of this magnitude nationwide, and in such basic areas as training, communications, ground ambulance service, etc. Inadequate ground ambulance service alone represents a serious problem, particularly in rural areas where financial considerations have driven great numbers of private purveyors from the field.

Some idea of the priorities assigned to these matters by the States themselves can be seen from the fact that over 1,000 projects have been submitted for the acquisition of ground ambulances and related expenses under the matching-fund programs of Section 402 of the Highway Safety Act. During the same period, only four projects for helicopters in EMS were funded, and one of these involved National Guard aircraft and flying personnel. None is currently being funded. Creation of a responsive civilian air ambulance service alone would be a financial impossibility, even for communities of some size; the economic basis for the operation would generally have to be developed for multifunctional use of the aircraft and personnel. A discussion of civilian air ambulance operations is presented in the Appendices.

When MAST was undertaken, the Secretary of Defense indicated that the experience gained was to be made available to the civilian sector so that helicopter operators might be assisted and encouraged. Increasing

interest in the versatile capability of helicopters heightened by the federally-funded projects, the increasing availability of more suitable helicopters, the trend toward concentration of medical facilities in metropolitan areas, and diminishing rural ground-ambulance service are factors which indicate civilian air ambulance operators have a promising future. Under present financial circumstances, however, and in the light of 56,000 annual highway fatalities alone, the military capability should be utilized where it can contribute effectively, while at the same time civilian operations should be encouraged and assisted as practicable. These considerations have been discussed with the Helicopter Association of America, and continuing efforts should be made to foster civilian air ambulance development.

COST CONSIDERATIONS

MAST operations conducted during the test period did not receive any additional funding from any of the services or agencies involved. All missions flown by the aviation units involved were accommodated in their regular flying operations as aviation training.

Costs associated with the MAST operation are of limited relevance and utility to the civilian community, since helicopters designed for the military mission are larger and more costly than those ordinarily feasible and employed in civilian applications. The only significant costs that can appropriately be assigned to MAST operations are those related to the direct operating costs of the helicopters and salaries of aviation crew members. (Even here, it must be recognized that flight operations would ordinarily have been flown for training had there been no MAST missions.) Fixed costs of acquisition, depreciation, hull and liability insurance, hangar fees and administrative costs, all of which are major factors to civilian operators, have no direct application to the military case.

Should MAST be continued or expanded on a regular basis, it would be desirable to identify costs that can realistically be associated with MAST. This data is set forth in the Appendices.

LEGAL ASPECTS

Local commanders are presently authorized to provide assistance to any individual in a serious emergency when other means of transport are not available, feasible, or adequate (AR-500-60 and AFR 76-6). Since the program was undertaken as a pilot project, no fundamental legislative or administrative measures authorizing permanent operation were necessary and none have been put forth.

FUTURE ACTIVITY

The capability of helicopters in Emergency Medical Service systems and the feasibility of using military resources has been clearly seen in MAST. Continued experimentation with these concepts is justified on the basis of accomplishments to date, and has been recommended by such authorities as the National Advisory Commission on Health Manpower in 1967 and the President's Commission on Highway Safety in 1969. The MAST program is consistent with the objective of the President's Health Message to Congress in 1971 which discusses—among other matters—the need to provide health care in rural and outlying areas.

The clearly successful operation at San Antonio demonstrates what MAST can accomplish under the best circumstances. Operations at other sites, while certainly beneficial, showed a singificantly lower degree of utilization. This presents a real question as to whether dedication of the helicopters and military personnel necessary to

provide the instant response ('round-the-clock), by which the benefits of the system can most effectively be realized, is adequately justified to fly about one mission per week (Fort Lewis and Fort Carson).

The potential of MAST was demonstrated at San Antonio, but was not realized to the same degree at other sites. Inconclusive causes were adduced for this lower utilization. A sensible course would be to advance the MAST concept to selected additional sites—to find other San Antonios— rather than to undertake a broader national program until the determinants of a well-utilized program emerge more clearly.

Another factor which argues for a gradual, rather than an all-out, program is the desirability of encouraging civilian operations.

The testimonial material in the appendices illustrates the acceptance of military assistance by the civilian community. For this reason alone, it would be desirable for all the Services to become involved in MAST operations.

The initial program was undertaken with active duty aviation units only. National Guard and Reserve components, however, are now beginning to receive more adequate helicopters (UH-ID) and qualified personnel, and it seems likely that an effective contribution could be made if a responsive service were established. A proposal for arranging National Guard active duty training time so as to provide a full-time response is presented in the Appendices. National Guard or Reserve units, with their close association in the community, might influence the utilization of MAST at some sites.

In the future, it seems likely that the capabilities of the helicopter will find increasing application in air ambulance roles, as well as in other functions. A limited expansion of the MAST operation is recommended as the next step in advancing air ambulance operations. Comprehensive planning for broader expansion of the program appears warranted by the potentialities already seen.

It seems reasonable to assume a role exists for both military and civilian operations. A proposal for a national approach using military or civilian helicopters is contained in the Appendices. This type of planning is recommended under sponsorship of the Interagency Study Group while MAST operations continue.

Future MAST projects should be coordinated through the Governor's office to insure the military assistance is integrated with civilian EMS projects supported by the Departments of Transportation, and Health, Education, and Welfare and, also, Civil Defense.

As previously indicated, operations at the five project sites are continuing, pending a final evaluation of the overall program and a decision as to future military involvement in MAST-type activities. Since January 1, 1971, there has been a significant increase in the number of MAST missions flown by the supporting aviation units at Fort Carson, Colorado and Fort Lewis, Washington. Through August 22, 1971, Fort Carson has accomplished 129 evacuations involving 173 seriously injured or ill civilian patients; Fort Lewis has flown 108 missions evacuating 123 patients.

The increased activity at both sites is attributed to an extensive educational program concerning all aspects of MAST which is being conducted on a continuing basis by the civilian and military officials participating in the two projects. This has resulted in the more direct involvement of representatives from all elements of the local EMS system as well as other public officials, concerned with using the military capability. Although the Fort Sam Houston, Texas site was considered to be the most successful project during the test period, the projects at Fort Carson and Fort Lewis are now operating with equal effectiveness.

In August 1971, both Luke AFB and Mountain Home AFB received additional aircraft and crew, enabling them to respond to MAST requests on a 'round-the-clock basis. This increased military capability should result in more effective operations at both sites.

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